

ARMSTRONG'S ROOF INSULATIONS

CORKBOARD

TEMLOK

ARMSTRONG CORK COMPANY

BUILDING MATERIALS DIVISION



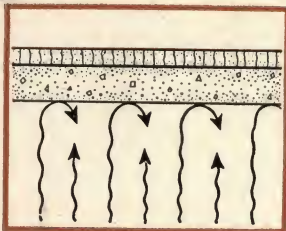
LANCASTER, PENNSYLVANIA

WHY ROOF INSULATION?

Uninsulated roofs are expensive and wasteful. They contribute to excessive fuel and refrigeration costs by reducing the efficiency of heating and air conditioning systems. In buildings where high humidities are maintained, uninsulated roofs permit damage through moisture condensation. These serious threats to efficient building operation can be readily eliminated by the proper application of adequate thicknesses of Armstrong's Temlok® or Corkboard Roof Insulation.

Insulation to Prevent Heat Loss

The materials which compose the usual roof construction are relatively good conductors and permit a flow of heat that causes discomfort in summer and wastes fuel in winter. The following example illustrates the effect on heat transmission produced by the addition of 2" of Armstrong's Corkboard Roof Insulation to regular roof deck construction:



Transmission per square foot for 70° F., difference in temperature through 4" of concrete plus standard roofing, per hour 50.40 Btu.

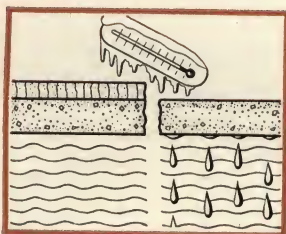
Transmission for the same construction and conditions with addition of 2" of Armstrong's Corkboard to roof, per hour 8.40 Btu.

In other words, the addition of 2 inches of Armstrong's Corkboard reduces the heat flow through the roof 83.5% and greatly reduces the amount of fuel used.

(See page 7 for charts which will enable you to determine how various thicknesses of Armstrong's Temlok or Corkboard Roof Insulation will reduce heat flow through most types of roof constructions.)

Insulation to Prevent Condensation

Condensation on ceilings or the underside of uninsulated roofs, and frequently on walls as well, is a serious problem in many industries where a high relative humidity is maintained. Synthetic fiber plants, paper mills, textile mills, and laundries are notable examples.



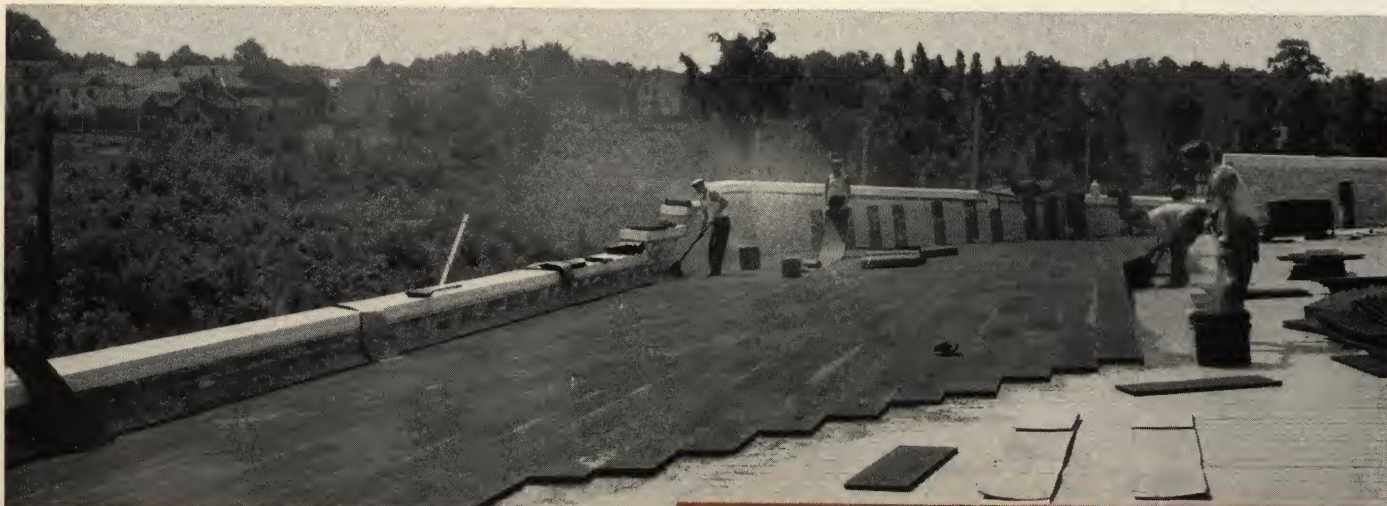
Condensation, or sweating, is caused by the contact of warm, humid air with a cold surface. There are two ways to prevent condensation. One is to reduce the relative humidity of the air. The other is to lower the heat transmission of the roof and walls so that they will not become cooled to the dew point, at which condensation will take place.

The latter is the more practicable method. It does not necessitate altering the humidity conditions essential to many manufacturing processes in which a reduction of the amount of moisture in the air is either undesirable or economically impractical. In these cases, it is much simpler and far more effective to prevent chilling of building surfaces by insulating them and so make sweating impossible. Unless steps are taken to eliminate condensation in many buildings, serious damage or financial loss can result.

Some of the most important consequences are:

1. Dripping of water injures materials, rusts or otherwise damages machinery, and creates conditions detrimental to manufacturing processes.
2. Moisture promotes rapid decay.
3. In wood roof construction, plaster ceilings under an uninsulated roof are easily damaged by condensation.
4. Moisture absorbed by a roof structure increases its conductance and promotes even more rapid chilling with its attendant condensation of water vapor.

(See page 7 for charts which will enable you to determine the thicknesses of Armstrong's Corkboard or Temlok Roof Insulation necessary to prevent condensation.)



ARMSTRONG'S TEMLOK ROOF INSULATION



Temlok provides greater comfort and fuel savings during the entire life of a normally heated building. Its use is recommended when service conditions are moderate.

Thermal Conductivity of Armstrong's Temlok is 0.35 Btu at 75° F. for 1" thickness and greater; conductivity for 1/2" thickness is 0.36 Btu.

Resistance to Fungus, Dry Rot, and Termites. Temlok is completely sterilized in the manufacturing process and is highly resistant to dry rot and fungus growth. The resin content of the wood fibers from which the product is manufactured makes Temlok naturally resistant to termites and other vermin.

Moisture Resistance. Tests show only 2.2% water absorption by volume. (Percentage allowed by U. S. Commercial Standard CS42-35 and Federal Specification LLL-F-321b is 5% for insulating boards and 10% for roof insulation.)

Strength. Temlok exceeds U. S. Commercial Standard CS42-35 and Federal Specification LLL-F-321b for Transverse Strength (12 lbs. breaking load for standard specimen) and for Tensile Strength (175 lbs. per sq. inch) and is well within those specifications for Deflection (0.25 inch minimum, 0.85 inch maximum).

Light Weight. Temlok Roof Insulation averages 1.35 lbs. per board foot. Temlok is easy to saw and nail, absorbs little asphalt or pitch, is inexpensive yet practical for a wide variety of roof insulation jobs.

Table at left shows sizes, coverage, and other physical characteristics of Armstrong's Temlok Roof Insulation.

Thickness	Over-all Size	Coverage of Net Size	Edge Treatment	Homogeneous or Laminated	Depth of Shiplap
1/2"	24" x 48"	24" x 48"	Square	Homogeneous	None
1"	24" x 48"	24" x 48"	Square	Homogeneous	None
1 1/2"	23 3/8" x 47 1/8"	23 3/4" x 47 1/4"	Shiplapped	Homogeneous	3/8"
1 1/2"	24" x 48"	24" x 48"	Square	Laminated	None
1 1/2"	24 3/4" x 48 3/4"	24" x 48"	Shiplapped	Laminated	3/4"
2"	24" x 48"	24" x 48"	Square	Laminated	None
2"	25" x 49"	24" x 48"	Shiplapped		1"

ARMSTRONG'S CORKBOARD ROOF INSULATION



Corkboard's insulating efficiency and high natural resistance to moisture make it the ideal insulation for long service under extreme conditions.

Thermal Conductivity is 0.27 Btu at 60° F.

Resistance to Fire, Decay, and Vermin. Corkboard will not support combustion, being classified as fire-retardant. It resists decay and will not harbor vermin.

Strength. Corkboard is strong and tough and will not shrink, swell, or warp.

Light Weight. Armstrong's Corkboard weighs 0.65 lb. per board foot.

Sizes. 12" x 36", 18" x 36", and 24" x 36". Thicknesses: 1", 1 1/2", 2", 3", and 4".

Federal Specification. Conforms to HH-C-561a.

GENERAL ROOF INSULATION SPECIFICATIONS

Note: Asphalt or pitch may be used interchangeably for applying the vapor seal, insulation, and roofing, but they should not be used together.

To assure an effective vapor seal and also a strong bond between the roof deck, membrane, insulation, and roofing it is important that the asphalt or pitch be applied to proper thickness. To ensure this, it is recommended that in the kettle the temperature of the asphalt should not exceed 400° F. and the pitch 375° F. Apply at least 40 lbs. of asphalt or pitch per square for each mopping. The membrane material, insulation, and roofing all must be applied immediately after asphalt or pitch has been spread and while it is still hot to provide a strong bond.

1. Condition of Roof Deck: The roof deck must be dry, smooth, firm, and free from any loose materials and

dirt before corkboard or Temlok insulation is applied.

2. Waterproofing at Edges: Extend waterproofing membrane up all vertical surfaces 4" above top of insulation, turn down on top of insulation, and mop in place with asphalt or pitch to seal.

3. Joints: All transverse joints shall be broken and all joints sealed by sliding each board into its final position while the asphalt or pitch is hot and butting it tightly against the adjacent boards.

4. Multiple Layers of Insulation: Additional layers of insulation shall be installed in the same manner as the first and shall break joints with the first layer.

5. Cut and fit insulation closely around penthouses, parapets, firewalls, vent pipes, ventilators, skylights, etc.

SPECIFICATIONS FOR TEMLOK ROOF INSULATION

1. CONCRETE DECK

Priming of Deck—If asphalt is to be used, apply one coat of Armstrong's No. 3 Asphaltic Paint or other suitable primer over entire surface of roof deck and allow to dry before proceeding with further work.

Application of Insulation—Lay Armstrong's Temlok Insulation inches thick in hot asphalt or pitch mopped to the deck surface. On a steeply inclined or vertical surface use inserted nailing strips of treated wood, two per board, or apply treated wood strips 48" apart, bolted every 4', as thick as the first layer of Temlok. Where wood strips are inserted in deck, additionally secure Temlok with two nails at each strip. Nails should extend $\frac{3}{4}$ " into nailing strip. Where strips are on surface, toenail Temlok with two nails at each end.

Alternate Specification for Heavy Duty

Application of Waterproof Membrane—If asphalt is to be used, prime deck with Armstrong's No. 3 Asphaltic Paint or other suitable primer and allow to dry. Apply 15-lb. saturated felt lapped half its width mopped with hot asphalt or pitch. For application of insulation proceed as above.

2. PRECAST GYPSUM (or similar) SLAB DECK

Application of Waterproof Membrane—If asphalt is to be used, prime slabs to within 4" of joints with Arm-

strong's No. 3 Asphaltic Paint or other suitable primer and allow to dry. Mop hot asphalt or pitch on each area, keeping 4" away from joints and apply 15-lb. saturated felt lapped half its width.

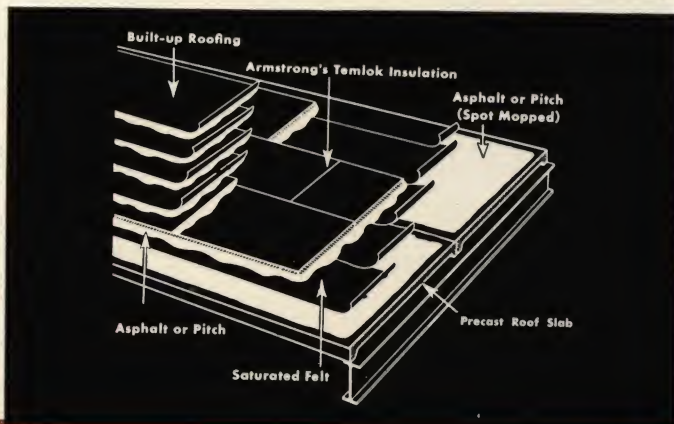
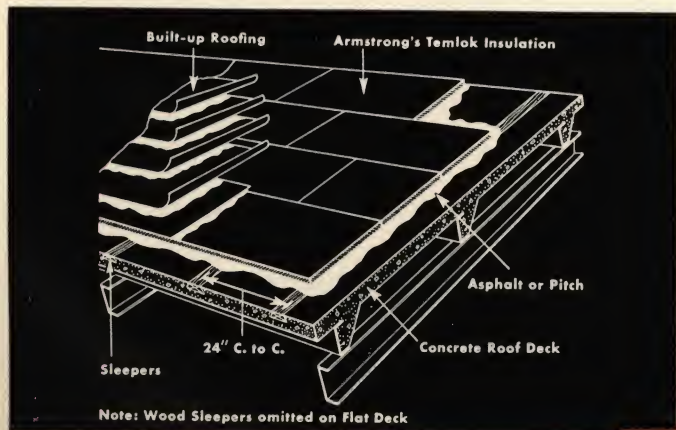
Application of Insulation—Lay Armstrong's Temlok Insulation inches thick in hot asphalt or pitch applied directly to the waterproof membrane.

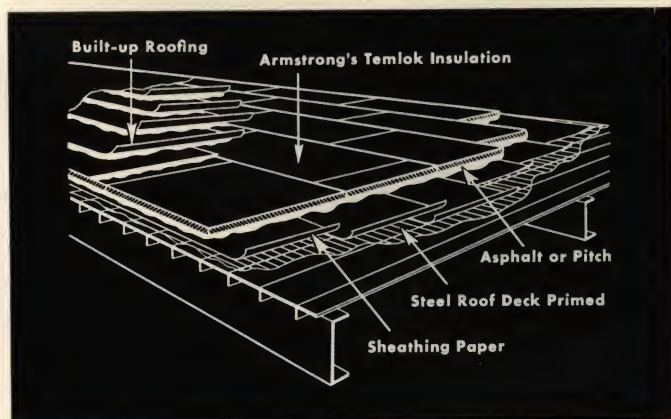
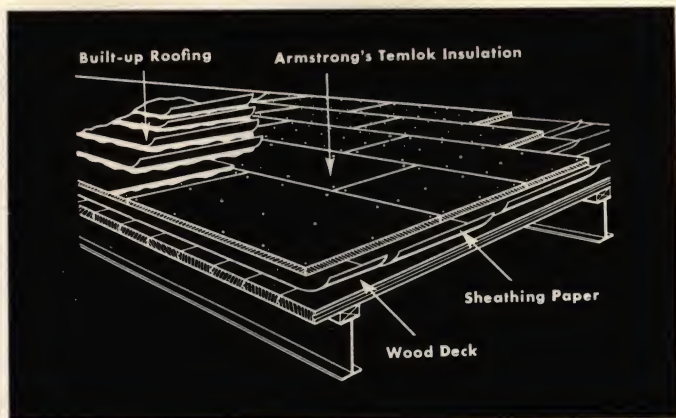
On steeply inclined or vertical surfaces, brad the saturated felt membrane and nail the insulation after applying in asphalt or pitch. Use galvanized nails 12" o.c. both ways and along all edges, nails to extend $\frac{3}{4}$ " into deck or nailing strips.

Instead of nailing directly into precast slabs, inserted strips of treated wood, two per board, may be used or treated wood strips as thick as first layer of insulation may be applied to surface, spaced 48" apart and bolted every 4'. After Temlok has been applied in asphalt or pitch, additionally secure each board with two nails at each inserted strip, nails to extend $\frac{3}{4}$ " into strip. Temlok applied between surface strips should be toenailed to strips with two nails at each end.

3. WOOD DECK

Application of Insulation—Apply a layer of sheathing paper lapped 2" and tacked to hold in place. Lay the first layer of Temlok Insulation inches thick,





dry, and nail to deck with galvanized nails 12" o.c. both ways, and around all edges, nails to penetrate deck $\frac{3}{4}$ ". Mop succeeding layers in hot asphalt or pitch.

Alternate Specification for Heavy Duty

Application of Waterproof Membrane—Over the sheathing paper, lay 15-lb. saturated felt lapped half its width and nailed along upper edges sufficiently to hold in place.

Application of Insulation—Lay Armstrong's Temlok Insulation inches thick in hot asphalt or pitch mopped directly to the waterproof membrane, nailing the first layer as specified above.

4. STEEL DECK

Priming of Deck—If deck does not have a factory-applied prime coat, apply one coat of Armstrong's No. 4 Asphaltic Paint or other suitable primer.

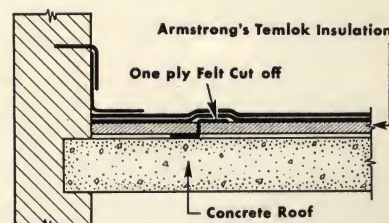
Application of Insulation—Cover deck with a layer of sheathing paper or 15-lb. saturated felt to prevent dripping of asphalt or pitch through roof deck seams. Apply over asphalt primer while still tacky, or by spot mopping in hot asphalt or pitch. Lay Armstrong's Temlok Insulation inches thick in hot asphalt or pitch applied directly to the sheathing paper or felt.

On any surface inclined more than 3" per foot or on vertical surfaces, the Temlok shall be additionally se-

cured to the deck with suitable devices as made by and in accordance with instructions of the manufacturer.

5. WATER CUTOFF

Isolate Temlok Roof Insulation in areas not greater than 30 feet square over the entire roof, and three feet back from all parapet walls or borders, by a felt cutoff strip. Strips shall be mopped to the roof deck and to the top surfaces of the insulation with asphalt or pitch.



6. APPLICATION OF ROOFING

Built-up roofing shall be applied directly to the surface of the insulation and the application of both shall go forward at the same time. The first layer of roofing shall be applied to the insulation with asphalt or pitch. No insulated areas shall be left exposed overnight. Where the work is stopped at the end of the day, all edges of the insulation shall be protected and sealed off so that no water can get under the seal. This seal shall be drawn tightly over the edges of the insulation so that it will not be necessary to break it when work is resumed.

SPECIFICATIONS FOR CORKBOARD ROOF INSULATION

1. CONCRETE DECKS

Priming of Deck—If asphalt is to be used, apply one coat of Armstrong's No. 3 Asphaltic Paint or other suitable primer over entire roof deck and allow to dry.

Application of Insulation—Lay Armstrong's Corkboard inches thick in hot asphalt or pitch mopped to the deck surface.

On a steeply inclined or vertical surface use inserted nailing strips of treated wood 18" o.c. or apply treated wood strips 36" apart, bolted every 4', as thick as the first layer of corkboard.

Where wood strips are inserted in deck, additionally secure corkboard with two nails at each strip. Nails

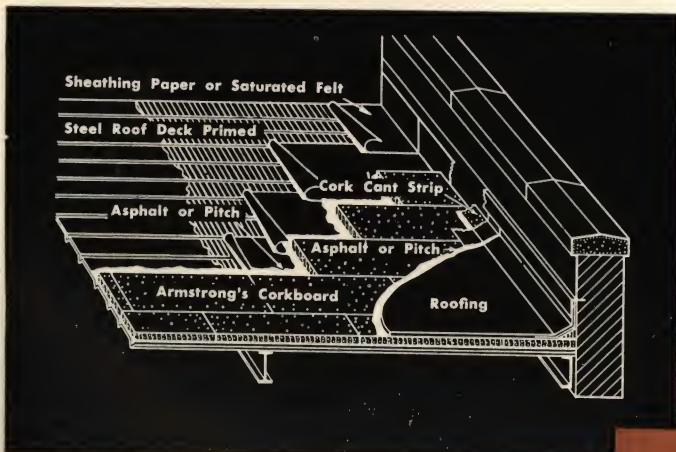
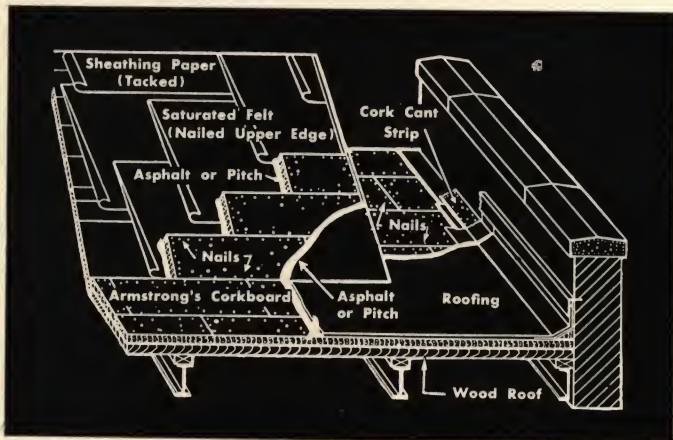
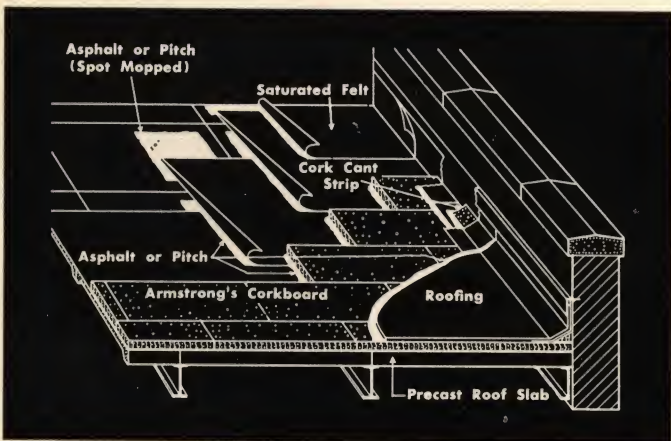
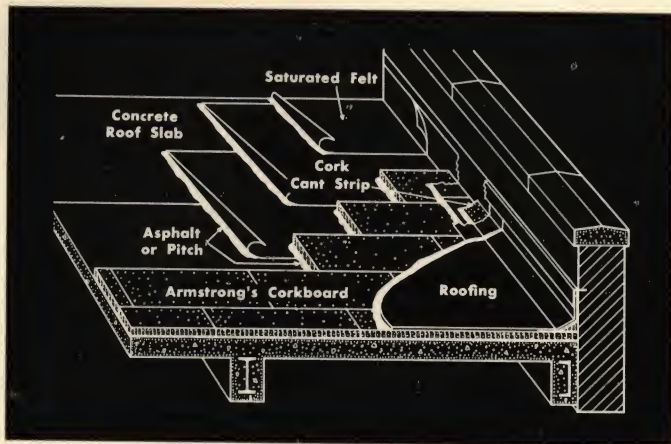
should extend $\frac{3}{4}$ " into nailing strip. Where strips are on surface, toenail corkboard with two nails at each end.

Alternate Specification for Heavy Duty

Application of Waterproof Membrane—If asphalt is to be used, prime deck with Armstrong's No. 3 Asphaltic Paint or other suitable primer and allow to dry. Apply 15-lb. saturated felt lapped half its width mopped with hot asphalt or pitch. Apply insulation according to preceding specification.

2. PRECAST GYPSUM (or similar) SLAB DECK

Application of Waterproof Membrane—If asphalt is to be used, prime slabs to within 4" of joints with Armstrong's No. 3 Asphaltic Paint or other suitable primer



and allow to dry. Mop hot asphalt or pitch on each area, keeping 4" away from joints and apply 15-lb. saturated felt lapped half its width.

Application of Insulation—Lay Armstrong's Corkboard inches thick in hot asphalt or pitch.

On a steeply inclined or vertical surface, brad the saturated felt membrane and nail the insulation after applying in asphalt or pitch. Use one nail per square foot, nails to extend $\frac{3}{4}$ " into deck or nailing strips.

Instead of nailing directly into precast slabs, inserted strips of treated wood 18" o.c. may be used, or treated wood strips as thick as first layer of insulation may be applied to surface, spaced 36" apart and bolted every 4'. After corkboard has been applied in asphalt or pitch, additionally secure each board with two nails at each inserted strip, nails to extend $\frac{3}{4}$ " into strip. Corkboard applied between surface strips should be toenailed to strips with two nails at each end.

3. WOOD DECK

Application of Insulation—Apply a layer of sheathing paper lapped 3" and tacked to hold in place. Lay the first layer of Armstrong's Corkboard inches thick, dry and nail to deck with galvanized nails, one per square foot, nails to penetrate deck $\frac{3}{4}$ ". Mop succeeding layers of corkboard in hot asphalt or pitch.

Alternate Specification for Heavy Duty

Application of Waterproof Membrane—Over the sheathing paper, lay 15-lb. saturated felt lapped half its width and nailed along upper edges sufficiently to hold in place.

Application of Insulation—Lay corkboard inches thick in hot asphalt or pitch, mopped to the waterproof membrane, nailing first layer as specified above.

4. STEEL DECK

Priming of Deck—If deck does not have a factory-applied prime coat, apply one coat of Armstrong's No. 4 Asphaltic Paint or other suitable primer.

Application of Insulation—Cover deck with a layer of sheathing paper or 15-lb. saturated felt to prevent dripping of asphalt or pitch through roof deck seams. Apply over asphalt primer while still tacky, or by spot mopping in hot asphalt or pitch. Lay Armstrong's Corkboard Insulation inches thick in hot asphalt or pitch. On any surface inclined more than 3" per foot or on vertical surfaces, the corkboard shall be additionally secured to the deck with suitable devices.

5. WATER CUTOFF

Install water cutoffs of 2 plies of saturated felt and alternate mopping of asphalt or pitch every 20' in one direction across the roof (or in accordance with roofer's specifications). Cutoffs shall extend 6" on waterproofing membrane and 4" on surface of corkboard.

6. APPLICATION OF ROOFING

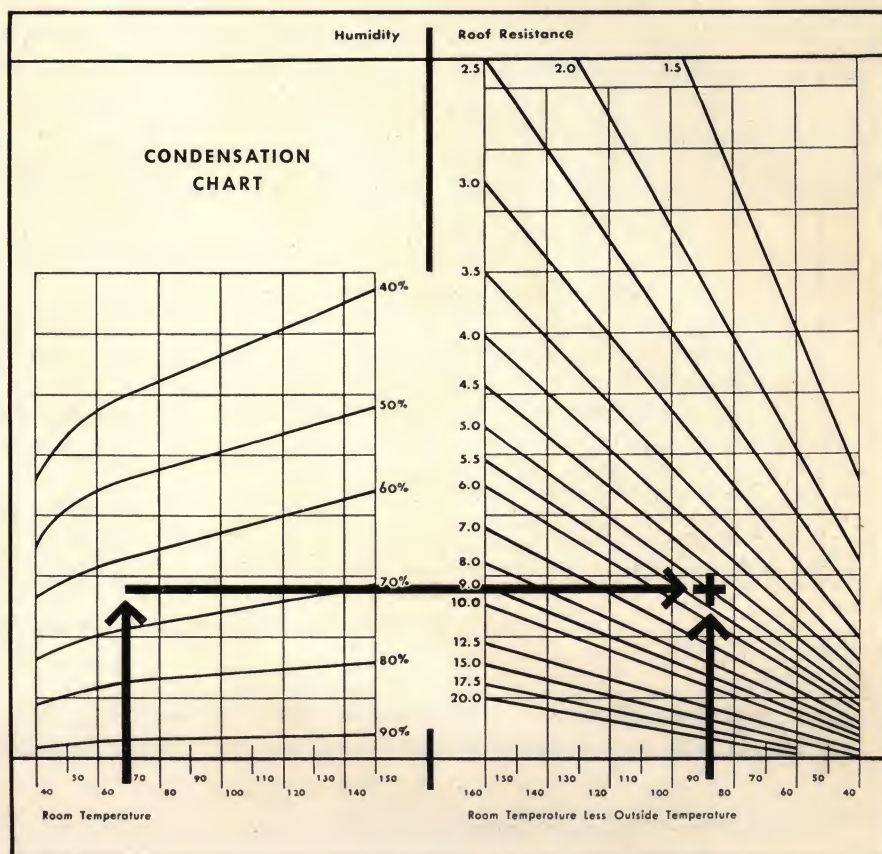
Built-up roofing shall be applied directly to the surface of the insulation and the application of both shall go forward at the same time. The first layer of roofing shall be applied to the insulation with asphalt or pitch. No insulated areas shall be left exposed to the weather overnight. Cover insulation with roofing immediately and at the end of each day's work strip and seal the edges. When work is resumed, remove any stripping which does not run in same direction as regular water cutoffs.

HOW TO DETERMINE ADEQUATE INSULATION

These tables show how thick your roof insulation must be to prevent condensation on the ceiling in cold weather. They also can be used in determining how various thicknesses of insulation reduce heat flow through roof structures.

To Determine the Thickness of Insulation Needed to Prevent Condensation, start at the point of desired room temperature in the left hand section of the Condensation Chart (assume 70° F.). Proceed vertically to intersection with the curve of humidity (assume 65%). Then project this line horizontally to the right hand portion of the chart until it intersects a line passing vertically through the point representing maximum difference between indoor and outdoor temperatures. (Assume lowest outdoor temperature to be 20° below zero. The difference between -20° and the indoor figure of 70° F. is 20 plus 70, or 90.) The point of intersection falls on the line 5.0. Interpolated with the Roof Resistance Table at right, column R, and assuming a sheet steel roof deck, 1½" thickness of Armstrong's Corkboard will provide a resistance of 6.21, which is in excess of the 5.0 required. Allowing for a margin of safety, 2" thickness of Armstrong's Temlok Roof Insulation will provide a resistance of 6.32, which is also in excess of 5.0.

To Determine Transmission of Heat Through Insulated Roof Construction, refer to the U column in the Roof Resistance Table. Assuming the same conditions as outlined above, with a temperature difference of 90° F., an uninsulated sheet steel deck would transmit 85.50 Btu per square foot per hour. (This figure is arrived at by multiplying .95, the transmission in Btu per sq. ft. per hour per degree temperature difference by 90, the number of degrees of temperature difference.) With the addition of 1½" of Armstrong's Corkboard, that transmission would be cut to 14.40 Btu per square foot per hour (.16 x 90). The addition of 2" of Armstrong's Temlok would reduce the transmission of heat per hour to the same figure, 14.40.



Roof Resistance Table—Corkboard and Temlok

Type of Roof	Armstrong's Corkboard Insulation	R*	U†	Armstrong's Temlok Insulation	R*	U†
Sheet Steel Deck and Roofing	No Insulation	1.05	.95	No Insulation	1.05	.95
	1" Corkboard	4.49	.22	½" Temlok	2.37	.42
	1½" Corkboard	6.21	.16	1" Temlok	3.69	.27
	2" Corkboard	7.93	.13	1½" Temlok	5.00	.20
	3" Corkboard	11.37	.09	2" Temlok	6.32	.16
	4" Corkboard	14.81	.07			
2" Concrete Slab and Roofing	No Insulation	1.22	.82	No Insulation	1.22	.82
	1" Corkboard	4.65	.21	½" Temlok	2.53	.40
	1½" Corkboard	6.37	.16	1" Temlok	3.85	.26
	2" Corkboard	8.09	.12	1½" Temlok	5.16	.20
	3" Corkboard	11.53	.09	2" Temlok	6.48	.16
	4" Corkboard	14.97	.07			
4" Concrete Slab and Roofing	No Insulation	1.39	.72	No Insulation	1.39	.72
	1" Corkboard	4.82	.21	½" Temlok	2.70	.37
	1½" Corkboard	6.54	.15	1" Temlok	4.02	.25
	2" Corkboard	8.26	.12	1½" Temlok	5.33	.19
	3" Corkboard	11.70	.09	2" Temlok	6.65	.15
	4" Corkboard	15.14	.07			
6" Concrete Slab and Roofing	No Insulation	1.56	.64	No Insulation	1.56	.64
	1" Corkboard	4.99	.20	½" Temlok	2.87	.35
	1½" Corkboard	6.71	.15	1" Temlok	4.19	.24
	2" Corkboard	8.43	.12	1½" Temlok	5.50	.18
	3" Corkboard	11.87	.08	2" Temlok	6.82	.15
	4" Corkboard	15.31	.07			
2" (Wood) ** and Roofing	No Insulation	2.78	.36	No Insulation	2.78	.36
	1" Corkboard	6.24	.16	½" Temlok	4.10	.24
	1½" Corkboard	7.96	.12	1" Temlok	5.42	.19
	2" Corkboard	9.68	.10	1½" Temlok	6.73	.15
	3" Corkboard	13.12	.08	2" Temlok	8.05	.12
	4" Corkboard	16.56	.06			
3" (Wood) ** and Roofing	No Insulation	3.85	.26	No Insulation	3.85	.26
	1" Corkboard	7.24	.14	½" Temlok	5.17	.19
	1½" Corkboard	8.96	.11	1" Temlok	6.49	.15
	2" Corkboard	10.68	.09	1½" Temlok	7.80	.13
	3" Corkboard	14.12	.07	2" Temlok	9.12	.11
	4" Corkboard	17.56	.06			

R*—Resistance Factor = 1/U

**Nominal thickness specified—actual thickness used in calculations

U†—Transmission in Btu per sq. ft. per °F. temperature difference per hour

ARMSTRONG'S BUILDING MATERIALS

FLOORS

Asphalt Tile	Rubber Tile
Linotile®	Cork Tile
(Oil-Bonded)	Linoleum

WALLS AND CEILINGS

Monowall®	Linowall®
Temlok® Panels and Planks	Veos Wall Tile (Porcelain on Steel)

ACOUSTICAL MATERIALS

Cushiontone®	Corkoustic®
Arrestone®	Travertone

Travertone is a trade-mark for which registration is pending.

*® PCCorp.

INSULATIONS

Low-Temperature

Corkboard	Fiberglas**
Cork Covering	Mineral Wool Board
Foamglas*	Temlok

Heat

Magnesia	High Temperature
Air Cell	Other Heat Insulations

Insulating Refractories

Comfort

Corkboard and Temlok Roof Insulation
Armstrong's Insulating Wool
Temlok Lath Temlok Sheathing

Detailed information about any of these products and their applications may be obtained promptly from Armstrong Cork Company, Building Materials Division, Lancaster, Pennsylvania.

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